Docket No. 1156-011

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

**BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of: Rainer Hochsmann.

Serial No. 10/559,920

Filed: 04/20/2006

Group Art Unit: 1725

Examiner: Ing Hour Lin

For: METHOD FOR THE LAYERED CONSTRUCTION OF MODELS

Docket No. 1156.011

Mail Stop Appeal Brief-Patents
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313

**SUBSTITUTE Appeal Brief in response to Notification of Non-Compliant Appeal Brief mailed 06/20/2008**

## APPEAL BRIEF UNDER 37 C.F.R. § 1.192

Sir:

This is an Appeal Brief under 37 C.F.R. § 1.192 appealing the Final Rejection of claims in the above-referenced patent application, which were rejected in an Office Action dated September 19, 2007. Each of the topics required by 37 C.F.R. § 1.192 is presented in this Brief and is labeled appropriately.

## I. Real party in interest

VOXELJET GMBH, (a German Corporation) of Augsburg, Germany ("Voxeljet") and Prometal RCT GMBH (a German Corporation) of Augsburg, Germany ("Prometal") are the real parties in interest of the present application.

## II. Related appeals and interferences

There are no appeals or interferences related to the present application of which the Appellants are aware.

## III. Status of claims

Claims 20-37 stand finally rejected by the Office Action of September 19, 2007. Claims 1-19 are canceled and claims 20-37 are currently pending. Appellants hereby appeal the final rejection of independent claim 35 and the dependents claims 36 and 37. Claims 20-34 are rejected but not under appeal. Appellants respectfully request an indication of allowability of claim 35 and its dependents, claim 36 and claim 37, or at least a reversal of the obviousness rejection of the above claims.

## IV. Status of Amendments

Appellants submitted a Response with no amendments to the final office action dated September 19, 2007, submitted Nov.19, 2007. A notice of appeal was filed on December 19, 2007.

## V. Summary of claimed subject matter

For sake of clarity, the below paragraph reference numbers comport with the U.S. Patent Publication 20060237159, the published version of the present application.

Independent claim 35 is generally directed to a procedure for layered composition of a metal casting mould, including the steps of: a) mixing solid particles of a bonding agent comprising a salt-crystal or a salt-crystal and protein combination, with a sand that comprises quartz sand, zircon sand, olivine sand, fireclay sand or a combination thereof (paragraph 035), to form a bonding agent/sand admixture; b) applying a thin layer of the bonding agent/sand admixture to an assembly field of an assembly platform (paragraph 043); c) selectively applying an aqueous solvent via a droplet generator, in a sufficient dose (paragraph 043); d) dissolving with the aqueous solvent the salt-crystal or salt-crystal and protein combination, so that the salt-crystal or salt-crystal and protein combination substantially encompasses the sand particles within a layer and to underlying sand particles that may be present (paragraph 018); e) drying the aqueous solvent so that the bonding agent/sand admixture bind together (paragraphs 024 and 042); f) lowering the assembly platform (paragraph 043); g) repeating at least steps (a)-(e) for applying an additional layer until the metal casting mould is complete; h) casting a metal casting from the resulting metal casting mould (paragraph 026); i) coring the metal casting through the immersion

in a water bath (paragraph 026); j) dissolving the bonding agent/sand admixture in the water bath; and k) recycling the sand from the water bath (paragraph 047).

Dependent claim 36 is directed to the procedure according to claim 35, whereby the solvent is dried by applying microwave radiation heating or warm air (paragraphs 025 and/or 043).

Dependent claim 37 is directed to the procedure according to claim 35, whereby the bonding agent comprises at least magnesium sulphate or sodium polyphosphate (paragraph 036).

## VI. Grounds of rejection to be reviewed on appeal

Appellants are seeking a withdrawal of the obviousness rejection of claims 35-37 and an indication of allowability of those claims. The grounds of rejection to be reviewed on appeal are the following:

A. Whether claims 35-37 are unpatentable under 35 U.S.C. 103(a) over Melling et al. (US 5,573,055) in view of Sachs (US 6,036,777).

## VII. Arguments

Summary of Arguments:

Under 35 USC §132, *KSR v. Teleflex*, 82 USPQ2d 1385 and the USPTO Examination Guidelines[1], the Examiner has an obligation to make factual findings and advance reasons in support of rejections under 35 U.S.C. § 103. Appellants request that the obviousness rejection of claims 35-37 be reversed because: I) The factual finding made by the Examiner about the teachings of Melling is unsupported by substantial evidence (and is also an abuse of discretion) because there is nothing in Melling to suggest that Melling would consider the use of a salt-crystal or a salt-crystal and protein composition as a feasible binder material in its process and in fact teaches away from such a binder. The Examiner has omitted any factual findings to support aspects of the rejections, because the Examiner has failed to address the fundamental differences between a salt-crystal binder material (as in Applicants' claims) and the glassy binder material of Melling and thus the Examiner has failed to articulate any reasoning with some rational underpinning to support the legal conclusion of obviousness. Melling teaches a glassy binder material. Melling teaching of salt-crystals says it does not work:

[1] (Federal Register / Vol. 72, No. 195 / Wednesday, October 10, 2007 / Notices pages 57526 through 57535)

COMPARATIVE EXAMPLE I

Use of Crystalline Sodium Phosphate

75 grams of a crystalline sodium phosphate with an equivalent weight % composition as the phosphate glass having the composition $P_2O_5$ 70.2 wt %, $Na_2O$ 29.8 wt % was mixed thoroughly with 92.5 grams of AFS 100 foundry sand, and then mixed with 4 grams of tap water. The mixture was blown at a pressure of 60 pounds per square inch into a metal core box which had been preheated to 60° C. Compressed air at ambient temperature was then purged through the core box for 60 seconds. Using the crystalline sodium phosphate, on extraction from the core box, the Core collapsed. An equivalent treatment in the case of the equivalent phosphate glass would have resulted in a core with good handling characteristics.

II) taking into account any factual findings putatively made, the Examiner has failed to articulate any reasoning with some rational underpinning to support the legal conclusion of obviousness that the binder taught in Melling, would be obvious as applied to the Sachs reference or to the process claimed Applicants' invention; and III) The Examiner has failed to satisfy his burden to show that a salt-crystal and protein combination would be obvious from the prior art cited.

Argument

**A. The first grounds of rejection asserted by the Office Action dated September 19, 2007 of claims 35-37 as being obvious should be withdrawn since: I) The factual finding made by the Examiner about the teachings of Melling is unsupported by substantial evidence (and is also an abuse of discretion) because there is nothing in Melling to suggest that Melling would consider the use of**

**a salt-crystal or a salt-crystal and protein composition as a feasible binder material in its process and in fact teaches away from such a binder. The Examiner has omitted any factual findings to support aspects of the rejections, because the Examiner has failed to address the fundamental differences between a salt-crystal binder material (as in Applicants' claims) and the glassy binder material of Melling and thus the Examiner has failed to articulate any reasoning with some rational underpinning to support the legal conclusion of obviousness; II) taking into account any factual findings putatively made, the Examiner has failed to articulate any reasoning with some rational underpinning to support the legal conclusion of obviousness that the binder taught in Melling, would be obvious as applied to the Sachs reference or to the process claimed Applicants' invention; and III) the Examiner has failed to satisfy the Examiner's burden to show that a salt-crystal and protein combination would be obvious from the prior art cited.**

The Law

The key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. The Supreme Court in *KSR* noted that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit. The Court quoting *In re Kahn*[2] stated that

> " '[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated

[2] 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006).

reasoning with some rational underpinning to support the legal conclusion of obviousness.'" [3]

Also, as stated in the USPTO Examination Guidelines[4],

"Office personnel must explain why the difference(s) between the prior art and the claimed invention would have been obvious to one of ordinary skill in the art."

As to the issue of items merely selected from finite number of solutions of predictable results, *KSR* states:

"When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill in the art has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense."[5]

According to the USPTO Examination Guidelines and its citing of *KSR*,

"The rationale to support a conclusion that the claim would have been obvious is that all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded nothing more than predictable results to one of ordinary skill in the art at the time of the invention. '"[I]t can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does."'[6] If any of these findings cannot be made, then this rationale cannot be used to support a conclusion that the claim would have been obvious to one of ordinary skill in the art."[7]

Background and Argument Summary

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[3] *KSR*, 82 USPQ2d 1385, 1396.
[4] Federal Register / Vol. 72, No. 195 / Wednesday, October 10, 2007 / Notices page 57528, emphasis added.
[5] *KSR*, 82 USPQ2d 1385, 1390.
[6] *KSR*, 82 USPQ2d 1385, 1396.
[7] Federal Register / Vol. 72, No. 195 / Wednesday, October 10, 2007 / Notices page 57529

Each method of claims 35-37, as a whole, includes the provision mixing solid particles of a bonding agent comprising a salt-crystal or a salt-crystal and protein combination, with a sand to form a bonding agent/sand admixture. Then applying a thin layer of the bonding agent/sand admixture to an assembly field on an assembly platform. This admixture is essentially dry so it can be spread over the assembly platform. Next, then selectively applying water to the bonding agent/sand admixture for reacting the admixture to form the surfaces of the mould, then drying the water. For making the next layer, the assembly platform is lowered and the process is repeated until the metal casting mould is complete.

The prior art reference of Melling et al. cited by the Office Action of September 19, 2007 teaches a mould construction method that "include ramming, pressing, blowing and extruding the mix into a suitable forming means such as a core box" (Melling col. 1, lines 21-23). Also, Melling teaches a process where water is added to the mixture as a whole before mould construction, where Applicants' process is one where water is selectively added only to the areas where binding is required.

As the Examiner has admitted, "Melling et al. fail to teach the use of powder dispensing apparatus including an assembly platform" (Office Action, September 19, 2007; page 2). The Examiner then introduces the Sachs reference, stating "Sachs (col.4, lines 49+) teach the use of powder dispensing apparatus including an assembly and method for producing a mold fro casting molte metal...", but fails

to articulate any reasoning with some rational underpinning to support the legal conclusion of obviousness.

Additionally, the Examiner fails to recognize the fact that Melling teaches away from the use of a salt-crystal binder in preference to a glassy binder material. As apparent to one skilled in the art, Melling teaches away from the use of at least a salt-crystal binder composition and only teach the use of glassy type materials. This can be seen by the teachings of Melling generally, and particularly as illustrated by looking at Melling at Col. 18, lines 6-22.

Thus, the factual finding made by the Examiner about the teachings of Melling is unsupported by substantial evidence (and is also an abuse of discretion) because there is nothing in Melling to suggest that Melling would consider the use of a salt-crystal or a salt-crystal and protein composition as a viable binder material in its process and in fact teaches away from such a binder. Thus the Examiner has failed to articulate any reasoning with some rational underpinning to support the legal conclusion of obviousness.

Also, the Examiner does not address the claimed salt-crystal and protein combination.

> i. The factual finding made by the Examiner about the teachings of Melling is unsupported by substantial evidence (and is also an abuse of discretion) because there is nothing in Melling to suggest that Melling would consider the use of a salt-crystal or a salt-crystal and protein composition as a feasible binder material in its process and in fact teaches away from such a binder. The Examiner has omitted any factual findings to support aspects of the rejections, because the Examiner has failed to address the fundamental differences between a salt-crystal binder material (as in

> Applicants' claims) and the glassy binder material of Melling and thus the Examiner has failed to articulate any reasoning with some rational underpinning to support the legal conclusion of obviousness.

The Patent Office Examiners are first Factfinders in determining obviouness,

> "Office personnel fulfill the critical role of factfinder when resolving the *Graham* inquiries. It must be remembered that while the ultimate determination of obviousness is a legal conclusion, the underlying *Graham* inquiries are factual. When making an obviousness rejection, Office personnel must therefore ensure that the written record includes findings of fact concerning the state of the art and the teachings of the references applied. In certain circumstances, it may also be important to include explicit findings as to how a person of ordinary skill would have understood prior art teachings, or what a person of ordinary skill would have known or could have done. Factual findings made by Office personnel are the necessary underpinnings to establish obviousness."[8]

and in this case, the Examiner has misapprehended the teachings of Melling.

The Examiner fails to recognize the fact that Melling teaches away from the use of a salt-crystal binder in preference to a glassy binder material. As apparent to one skilled in the art, Melling teaches away from the use of at least a salt-crystal binder composition and only teach the use of glassy type materials. This can be seen by the teachings of Melling generally, and particularly as illustrated by looking at Melling at Col. 18, lines 6-22:

[8] (Federal Register / Vol. 72, No. 195 / Wednesday, October 10, 2007 / Notices page 57527)

## COMPARATIVE EXAMPLE I

### Use of Crystalline Sodium Phosphate

75 grams of a crystalline sodium phosphate with an equivalent weight % composition as the phosphate glass having the composition $P_2O_5$ 70.2 wt %, $Na_2O$ 29.8 wt % was mixed thoroughly with 92.5 grams of AFS 100 foundry sand, and then mixed with 4 grams of tap water. The mixture was blown at a pressure of 60 pounds per square inch into a metal core box which had been preheated to 60° C. Compressed air at ambient temperature was then purged through the core box for 60 seconds. Using the crystalline sodium phosphate, on extraction from the core box, the Core collapsed. An equivalent treatment in the case of the equivalent phosphate glass would have resulted in a core with good handling characteristics.

Thus, the factual finding made by the Examiner about the teachings of Melling is unsupported by substantial evidence (and is also an abuse of discretion) because there is nothing in Melling to suggest that Melling would consider the use of a salt-crystal or a salt-crystal and protein composition as a viable binder material in its process and in fact teaches away from such a binder. Thus the Examiner has failed to articulate any reasoning with some rational underpinning to support the legal conclusion of obviousness.

> II. taking into account any factual findings putatively made, the Examiner has failed to articulate any reasoning with some rational underpinning to support the legal conclusion of obviousness that the binder taught in Melling, would be obvious as applied to the Sachs reference or to the process claimed Applicants' invention

The prior art reference of Melling et al. cited by the Office Action of September 19, 2007 teaches a mould construction method that "include ramming, pressing, blowing and extruding the mix into a suitable forming means such as a

core box" (Melling col. 1, lines 21-23). As the Examiner has admitted, "Melling et al. fails to teach the use of powder dispensing apparatus including an assembly platform" (Office Action, September 19, 2007; page 2). The Examiner then introduces the Sachs reference, but fails to articulate any reasoning with some rational underpinning to support the legal conclusion of obviousness.

In view of the failure to articulate any reasoning with some rational underpinning to support the legal conclusion of obviousness, Applicants request a notice of allowance or a reversal of the obviousness rejection of claims 20-37 is requested.

iii. The Examiner has failed to satisfy his burden to show that a salt-crystal and protein combination would be obvious from the prior art cited.

Examiner asserts in an Advisory Action Before the Filling of an Appeal Brief, dated December 11, 2007, that the "use of protein for the bonding agent which is not an issue because the protein was rejected in the non-final office action and the protein is not claimed in the amended or new claims." Examiner is correct that protein alone is not included in the amended claims, but, a salt-crystal and protein combination is included in the claims. The Examiner has failed to address this combination and why it is obvious to the given references. In view of the failure to articulate any reasoning with some rational underpinning to support the legal conclusion of obviousness, Applicants request a notice of allowance or a reversal of the obviousness rejection of claims 35-37 is requested.

## VIII. Claims Appendix

Claim 35: A procedure for layered composition of a metal casting mould, comprising the steps of:

a) mixing solid particles of a bonding agent comprising a salt-crystal or a salt-crystal and protein combination, with a sand that comprises quartz sand, zircon sand, olivine sand, fireclay sand or a combination thereof, to form a bonding agent/sand admixture;

b) applying a thin layer of the bonding agent/sand admixture to an assembly field of an assembly platform;

c) selectively applying an aqueous solvent via a droplet generator, in a sufficient dose.

d) dissolving with the aqueous solvent the salt-crystal or salt-crystal and protein combination, so that the salt-crystal or salt-crystal and protein combination substantially encompasses the sand particles within a layer and to underlying sand particles that may be present;

e) drying the aqueous solvent so that the bonding agent/sand admixture bind together;

f) lowering the assembly platform;

g) repeating at least steps (a)-(e) for applying an additional layer until the metal casting mould is complete;

h) casting a metal casting from the resulting metal casting mould;

i) coring the metal casting through the immersion in a water bath;

j) dissolving the bonding agent/sand admixture in the water bath; and

k) recycling the sand from the water bath.

Claim 36: The procedure according to claim 35, whereby the solvent is dried by applying microwave radiation heating or warm air.

Claim 37: The procedure according to claim 35, whereby the bonding agent comprises at least magnesium sulphate or sodium polyphosphate.

## IX. Evidence appendix

None.

## X. Related proceedings appendix

None.

## XI. Conclusion

It is respectfully submitted that, based upon the above, Melling et al. in view of Sachs does not render the subject matter of claims 35-37 obvious. Appellants respectfully request an indication of allowability for claims 35-37 or at least a reversal of the obviousness rejection of claims 35-37.

If for some reason Appellants have not requested a sufficient extension and/or have not paid a sufficient fee for this response and/or for the extension necessary to prevent the abandonment of this application, please consider this as a request for an extension for the required time period and/or authorization to charge our Deposit Account No. 04-1512 for any fee which may be due.

Respectfully submitted,

Dated: June 26, 2008

By, 

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